cessing many specimens for the polymerase chain reaction has recently become available.

The speed and sensitivity of the reaction procedure offer advantages for both prenatal and microbiologic diagnosis. The method has been applied to the prenatal diagnosis of sickle cell anemia and will find wider application as the genetic defects underlying other familial disorders are identified. It is also capable of detecting minute quantities of viral DNA in clinical specimens even before seroconversion occurs. The polymerase chain reaction has already proved useful in research laboratories for detecting mutations of cellular proto-oncogenes that are thought to play a role in human carcinogenesis; it may soon be used clinically to characterize these mutations in individual patients.

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Fine-Needle Aspiration Biopsy in the Diagnosis of Lymphadenopathy in Persons at Risk for AIDS

LYMPHADENOPATHY is a common finding in the acquired immunodeficiency syndrome (AIDS) and in the AIDS-related complex (ARC). Although this lymphadenopathy usually has a restricted differential diagnosis, it can be difficult to establish the precise cause of the nodal enlargement by history, physical examination, radiographic studies, and laboratory tests.

At the San Francisco General Hospital and Medical Center, we have found fine-needle aspiration (FNA) biopsy to be an accurate, well-tolerated, cost-effective, and useful method to initially evaluate lymphadenopathy in patients with AIDS or ARC. We have done more than 120 FNA biopsies of lymph nodes in such patients.

In our experience, about half the lymph node biopsy specimens in such patients show lymphoid hyperplasia. The other half reveal non-Hodgkin's lymphoma, mycobacterial infection, Kaposi's sarcoma, Hodgkin's disease, and various metastatic tumors. The smears showing lymphoid hyperplasia are characterized by a pleomorphic population of lymphocytes, histiocytes, polymorphonuclear leukocytes, plasma cells, and other lymphoid elements. The smears showing non-Hodgkin's lymphoma are characterized by a monomorphic population of abnormal lymphoid cells; we have further classified these cases as diffuse large cell, large cell immunoblastic, and small noncleaved lymphomas. The smears of patients with mycobacterial infections have consisted of histiocytes with thousands of intracytoplasmic organisms. The smears showing Kaposi's sarcoma have clusters of bland spindle cells not associated with inflammatory elements.

Falsely abnormal results ("false-positives") of FNA biopsies of lymph nodes in this group of patients did not occur in our series, but falsely normal ("false-negatives") results can occur. Possible reasons for false-negative results include sampling errors in lymph nodes with focal disease, taking a biopsy of a benign lymph node in a patient with abnormal nodes elsewhere, and error in microscopic interpretation. Because false-negative FNA biopsies can occur, it is imperative that clinicians using this test realize that a benign result does not entirely rule out involvement of the lymph node by a malignant or infectious process.

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DNA Fingerprinting—Applications for Resolving Medical, Legal, and Criminal Issues

THERE IS NOW a genetic test to determine individual identity. This DNA test or "DNA fingerprinting" holds the same standard of certainty as a set of fingerprints. The test exploits the occurrence of tandem-repetitive regions of DNA—minisatellites—which are scattered throughout the human genome. The minisatellites are highly polymorphic or hypervariable, resulting from unequal exchanges that vary the number of short repeat units in a minisatellite. Researchers at Leicester University, England, isolated three human minisatellite DNA fragments by molecular cloning, each containing tandem repeats of closely related variants of a short consensus sequence. Using these cloned DNA fragments as probes to detect the homologous sequences in the restriction endonuclease-digested human DNA, they discovered DNA banding patterns ("fingerprints") that are completely specific to each person. The estimated frequency of unrelated persons showing the same DNA fingerprint is extremely low—5×10^{-19}—and for siblings to share the same pattern is only 1×10^{-6}.

The possible applications of this test to various fields are immense. It opens up a novel approach in forensic science: bits of tissue, stains of blood, or other body fluids left at the scene of a crime may be used to identify their human source. The test has already been done by the Leicestershire police to identify a murderer in a group of several thousand suspects. A miniscule specimen is sufficient to yield a few micrograms of DNA, material whose stability confers an additional advantage for its use as a marker for identification. The state of California is planning a computerized data bank of DNA fingerprinting information on convicted criminals to facilitate the rapid identification of repeat offenders. The test is also conclusive for all practical purposes in resolving cases of controversial parenthood or other familial relationships. Recently, an immigration case concerning questionable maternity was settled by DNA fingerprinting, permitting the son's emigration to England. Routine DNA fingerprinting by immigration authorities should accelerate the application process and avoid cases of arbitrary judgment by immigration officials.

The test provides an unequivocal criterion for discriminating between monozygotic and dizygotic twins of the same sex at birth, until now a problematic area in genetic studies involving human twins. Other potential medical applications of the test include monitoring engraftment of donor marrow;